

**NeuroPace<sup>®</sup>**

**RNS<sup>®</sup> System**

**Patient Manual**

**CAUTION: Federal law restricts this device to sale by or on the order of a physician.**

01/2013      DN 1013555 Rev 2



This Manual supports:

- RNS<sup>®</sup> Neurostimulator Model RNS-300M with firmware version 7.0
- NeuroPace<sup>®</sup> Cortical Strip Lead Models CL-315-10, CL-325-10, CL-335-10
- NeuroPace<sup>®</sup> Depth Lead Models DL-330-3.5, DL-330-10, DL-344-3.5, DL-344-10
- Magnet Model M-01

## **FCC Information**

The following is communications regulation information on the Model RNS-300M Neurostimulator and Model W-02 Wand.

Neurostimulator FCC ID: WBWRF300

Wand FCC ID: WBW902

All components comply with Part 15 of the FCC Rules. Operation is subject to the following 2 conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**IMPORTANT:** Changes or modifications to these components not expressly approved by NeuroPace, Inc. could void the FCC Certification, and negate your authority to operate them.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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## About the RNS<sup>®</sup> System

### Indications for Use

The RNS<sup>®</sup> System is an adjunctive therapy in reducing the frequency of seizures in individuals 18 years of age or older with partial onset seizures from no more than two foci that are refractory to two or more anti-epileptic medications.

### Epilepsy and its treatment

Epilepsy is a brain disorder that causes seizures. Seizures occur when there is a sudden electrical misfiring of nerve cells in the brain. These misfires can cause convulsions or spasms, confusion, staring blankly, and sometimes loss of consciousness. There is no one cause of epilepsy. Genetics, head trauma, medical and developmental disorders may all play a role. Epilepsy affects nearly 3 million Americans and 50 million people worldwide.

There are two types of seizures. **Partial seizures** occur in only one part of the brain. **Generalized seizures** affect various nerve cells throughout the brain.

Epilepsy is usually treated first with antiepileptic drugs. These drugs help to prevent seizures. If a person's epilepsy cannot be brought under control after trying two or more different antiepileptic drugs, that person's epilepsy is said to be *medically refractory*. Neurosurgery might then be considered as the next treatment option. Surgery involves removing or disconnecting the part of the brain that is triggering the seizures. Neurosurgery can be very helpful but not all people with epilepsy are candidates for surgery. Another option for some persons with medically refractory epilepsy is electrical stimulation therapy. Persons who are treated with neurosurgery or electrical stimulation in most cases continue to take antiepileptic drugs.

The type of treatment prescribed will depend on several factors. These include the frequency and severity of seizures, the person's age and overall health, and their medical history. An accurate diagnosis of the type of epilepsy is also critical to choosing the best treatment. The goal of all epilepsy treatment is to prevent further seizures, avoid the side effects of treatment, and make it possible for people to continue to lead lives that are not affected by seizures.

## Description of the RNS<sup>®</sup> System

The RNS<sup>®</sup> System is used to reduce the frequency of epileptic seizures in people who have not had a good response to at least two different anti-epileptic medications. It is designed for people who have seizures that start in one, or at most two, areas of the brain. People who use the RNS<sup>®</sup> System will continue to treat their epilepsy with medications.

A small, battery-powered device (called a Neurostimulator) is surgically implanted in the skull. Wires (called Leads) that are connected to the Neurostimulator are placed on and/or inside the brain. The Neurostimulator monitors the electrical activity of the brain and detects abnormal activity that could lead to a seizure. If abnormal activity is detected, the Neurostimulator delivers electrical stimulation to the brain through the Leads to help prevent the seizure before it occurs.

The Neurostimulator will be programmed for initial use by your doctor after it is surgically implanted. Then the Neurostimulator settings will be adjusted on an ongoing basis as needed. A computer (called the NeuroPace Programmer) lets your doctor do the initial programming and follow-up adjustments to the Neurostimulator. Adjustments are based on brain activity and response to stimulation, which are both stored in the Neurostimulator.

A Remote Monitor lets you collect data from the Neurostimulator, and send the data to your doctor. The Remote Monitor consists of a special software program installed on a laptop computer, a Wand and telephone accessories.

After connecting the hand-held Wand to the laptop, data in the Neurostimulator are collected by placing the Wand over the implant site. The Wand uses Radio Frequency (RF) communication to collect the data. Data are stored in the laptop and then sent to a secure database over a phone line. The database is called PDMS (**P**atient **D**ata **M**anagement **S**ystem) and only your doctor can access your data. Your doctor will review the data and use the results to adjust the Neurostimulator settings during future office visits.

As part of the System, your doctor will provide you with a Magnet. The Magnet instructs the Neurostimulator to record brain activity when you hold it in place over the Neurostimulator during a seizure. That way your doctor is able to identify the event during data review and make adjustments to the Neurostimulator settings as needed. Another use of the Magnet is to temporarily stop stimulation. Although not expected to happen, you may want to stop stimulation if you think you are feeling the stimulation.

A Medical Implant ID card is provided that lets others know you are using the Neurostimulator. Carry the card at all times. The card contains important information in

the event you are being treated by another doctor who is unfamiliar with the RNS<sup>®</sup> System. You should also show this card before going through security systems at airports and other places.

The Neurostimulator remains implanted until your doctor determines that battery power is low. Then it is time to replace the Neurostimulator. This is usually after 2 to 3.5 years with typical use. At that time, the Neurostimulator is removed and a new one is implanted. Unless the Leads need to be replaced, the new Neurostimulator will be connected to the same Leads.

## **Contraindications**

The RNS<sup>®</sup> System should not be used by people who:

- Are at high risk for surgical complications
- Have another medical device implanted that delivers electrical energy to the brain

**DO NOT** have any of the following medical procedures if you have the RNS<sup>®</sup> System implanted. These procedures produce energy that can travel through the Neurostimulator and Leads to the brain, and can result in brain injury or death. Turning the Neurostimulator off prior to the procedure will not prevent problems from occurring. Even if the Neurostimulator has been removed, problems can arise if any part of a Lead is still implanted. If you have any of the procedures listed below while you have the RNS<sup>®</sup> System implanted, it may result in serious injury or possible death.

- MRI – Magnetic Resonance Imaging (The RNS<sup>®</sup> System is “MRI Unsafe”).
- Diathermy – High-frequency electromagnetic radiation, electric current, or ultrasonic waves to induce heat in tissue anywhere on the body, either for therapy or relaxation.
- Electroconvulsive Therapy (ECT) – Electrically-induced seizures to treat psychiatric disorders.
- Transcranial Magnetic Stimulation (TMS) – Electromagnetic current to treat psychiatric disorders.

## Other Considerations

- You must be willing to see your doctor for follow-up visits for as long as the Neurostimulator is implanted. At first you can expect to see your doctor every 1 to 2 weeks, and then every 4 to 6 weeks as needed while your doctor adjusts the Neurostimulator settings. After that, you should expect to see your doctor every 3 to 6 months.
- You must be willing to collect data daily from the Neurostimulator, and then send the data to the PDMS database at least once a week. Your doctor may direct you to collect and send data more often.
- If you are unable to use the System safely and effectively on your own, a caregiver or family member must be available to assist you.
- To use the Remote Monitor to send data to the PDMS database, you must have access to an analog phone line.
- The Remote Monitor uses a toll-free number that is only available when dialing within the (50) United States. You will not be able to send data over the phone line while traveling outside the U.S. (see *Traveling with the RNS<sup>®</sup> System*).

# The RNS<sup>®</sup> System and its Parts

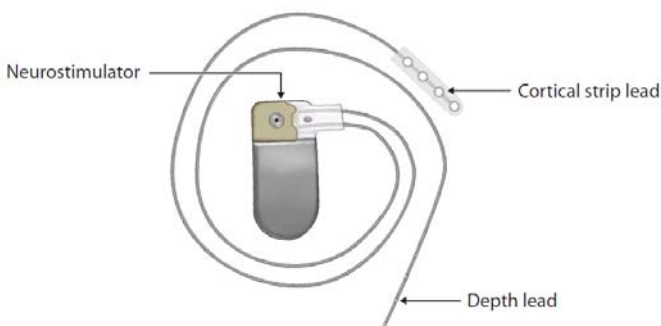
This Manual supports the following devices.

## RNS<sup>®</sup> Neurostimulator

The device implanted in the skull that delivers electrical stimulation.

## Cortical Strip and Depth Leads

The leads are wires that connect the Neurostimulator to areas of the brain where seizures start. The Neurostimulator senses your brain activity and delivers electrical stimulation through these wires.



## Magnet

A device that lets you record brain activity during a seizure. The Magnet also lets you temporarily stop stimulation.



## Medical Implant ID Card

A wallet-sized card that lets others know that you are using the RNS<sup>®</sup> System and makes them aware of procedures that are harmful.

## **Benefits and Risks of using the RNS<sup>®</sup> System**

There are benefits and risks associated with all medical devices and treatments. Talk to your doctor about the benefits and risks of the RNS<sup>®</sup> System and whether it is appropriate for you. Your doctor can also answer questions regarding the information in this Manual.

The RNS<sup>®</sup> System has been shown to reduce the frequency of disabling epileptic seizures in people for whom the RNS<sup>®</sup> System is intended. Clinical studies also show an overall improvement in quality of life as reported by patients using the RNS<sup>®</sup> System. Patients show improvements in specific areas related to thinking, memory, and seizure worry. Not all people will have the same results as were seen in clinical studies.

### **Risks of surgery and long-term use**

There are health risks associated with using the RNS<sup>®</sup> System. Risks include complications from surgically implanting the Neurostimulator and Leads. They also include problems related to the performance and long-term use of the RNS<sup>®</sup> System. Discuss these risks with your doctor.

The most common risks associated with surgery to implant the Neurostimulator and Leads are mild pain at the implant site, and headache. Less frequent risks are bleeding, and buildup of blood and other fluids between the brain and skull. Surgical risks with the RNS<sup>®</sup> System are comparable to other surgical procedures to treat epilepsy.

Risks associated with RNS<sup>®</sup> System treatment include infection, an increase in the frequency of seizures, and breakdown of the skin where the Neurostimulator is implanted.

Overall health risks do not increase with continued use of the RNS<sup>®</sup> System. This suggests that the RNS<sup>®</sup> System is well tolerated over time.

See Appendix A for more information on adverse events resulting from surgery and long-term use.

## **Neurostimulator/Leads replacements and failures**

The Neurostimulator should work for about 2 to 3.5 years with typical use, before the battery power is drained. How long your battery lasts depends on the stimulation levels your doctor sets up in the Neurostimulator. When the battery power gets very low, the Neurostimulator will need to be surgically replaced with a new one. The surgery involves first making an incision in your scalp. Then the surgeon will remove the old Neurostimulator from its holder secured in the skull, and replace it with a new one.

There is a small chance that the Neurostimulator or Leads may fail before the 2 to 3.5 year period ends. If the Neurostimulator is not working properly, it may not provide the right amount of stimulation at the right time. The Neurostimulator is designed to turn off if over-stimulation or excess current occurs.

You may not be aware of problems with the performance of the Neurostimulator or Leads unless you are having more frequent or more severe seizures than before. So it is important that you collect data daily with the Remote Monitor and send it to the PDMS database at least once a week. By sending your data on a regular basis, your doctor will be able to identify if any problems occur and make adjustments. If you are experiencing a change in the frequency or severity of your seizures, talk to your doctor as soon as possible. You should also collect and send data to the PDMS database on a more frequent basis until your doctor is able to make adjustments to the Neurostimulator settings.

Sometimes the Leads may move or need to be repositioned from their original location. Surgery may be necessary to resolve these problems.

People using the RNS<sup>®</sup> System will not be able to undergo certain medical procedures. These are procedures that might damage the Neurostimulator/Leads, or cause injury and even death. A list of these procedures can be found in the *Contraindications* and *Warnings and Precautions* sections of this Manual.

## **Interference from electronic devices**

Electrical devices and appliances in and around the home emit energy. That energy can interfere with the Neurostimulator, Leads and Remote Monitor. Interference of this type is called electromagnetic interference (EMI). The RNS<sup>®</sup> System is designed to operate in the presence of EMI. Common household devices and appliances that produce EMI have not been found to affect the operation of the Neurostimulator. These include cell phones, microwave ovens, other computers, computer wireless networks, Bluetooth

devices and televisions. The Neurostimulator has not been tested in the presence of all possible sources of EMI.

There is a small chance that large sources of EMI may affect the operation of the Neurostimulator. Talk to your doctor about what to do if you live or work near large sources of EMI like transmission towers, large electrical transformers or arc welders.

Additional information on the effect of EMI on the Remote Monitor can be found in the Remote Monitor Manual.

## **Unknown Risks**

The RNS<sup>®</sup> System has not been studied in the following groups:

- Pregnant women
- People under the age of 18
- People with other implanted devices (such as a pacemaker or defibrillator) that deliver electrical current to their bodies
- People using the RNS<sup>®</sup> System for more than 7 years

The benefits and risks of the RNS<sup>®</sup> System in these people are not known.

Other possible adverse events that may occur with the RNS<sup>®</sup> System but were not seen in clinical studies:

- Allergic reaction to the Neurostimulator and Leads
- Movement of the Leads
- Stroke
- Brain abscess

# Warnings and Precautions

## WARNING

### *Medical procedures*

The effects of certain medical procedures on the RNS<sup>®</sup> System have not been studied. Some of these procedures are discussed below.

**DO NOT** have any of these procedures without first making sure the person administering the procedure knows that you have the RNS<sup>®</sup> System implanted. Have them consult with the doctor who is currently monitoring your use of the RNS<sup>®</sup> System. Certain procedures also require that specific steps be taken to help ensure your safety. After any procedure, make sure to collect data from the Neurostimulator with the Wand and Remote Monitor and send it to the PDMS database. Then your doctor can confirm that the System is working properly.

The energy used in these procedures may damage the Neurostimulator and Leads. This can result in stimulation not being delivered until the Neurostimulator and Leads are surgically replaced or repaired. If you have any of the procedures listed below without first having consulted the doctor who is monitoring your use of the System, it may result in serious injury or possible death.

- Computerized Tomography (CT or CAT) scans should be performed only under the following conditions:
  - The Neurostimulator should be turned off prior to the procedure if possible. This should be done by your doctor or someone else who is authorized to adjust the settings using the NeuroPace Programmer.
  - The scan should be taken at the lowest X-ray beam level possible.
  - Avoid directing the beam at or near the implant site for more than a few seconds.
  - Emergency services need to be available in the event you have a serious adverse event. This is especially important if the scan area will include the implant site.
  - The Neurostimulator should be turned back on after the procedure by your doctor.

- If you require radiation therapy, such as cobalt 60 or gamma radiation to treat cancer, make sure that the doctor ordering this treatment talks to the doctor who is monitoring your use of the RNS<sup>®</sup> System before the treatment begins.
- Lithotripsy should not be directed at the head or neck. This procedure uses shock waves to break up hard masses that have accumulated in the body such as kidney stones.
- Electrolysis should not be performed on the head or neck. This procedure uses electric current to remove unwanted hair.

## CAUTION

### ***Medical Procedures***

Medical procedures, diagnostic x-rays, and dental work that do not involve any of the procedures in the *Contraindications* or *Warnings and Precautions* sections of this Manual are considered safe, but should be performed with caution. Let the person administering the procedure know that you have a RNS<sup>®</sup> System implanted. After the procedure, make sure to collect data from the Neurostimulator and send it to the PDMS database. This way your doctor can confirm that the RNS<sup>®</sup> System is working properly.

Electrocautery is a procedure that uses electric current to cut body tissue or stop bleeding during surgery or dental surgery. Electrocautery directed at body areas more than one inch away from the Neurostimulator or Leads is unlikely to cause a problem. If electrocautery is required, bipolar electrocautery at the lowest possible power setting is recommended.

## CAUTION

### ***Applying pressure on the Neurostimulator and Leads***

**DO NOT** press on or play with the implanted Neurostimulator or Leads. This may damage the Neurostimulator or Leads and result in stimulation not being delivered until they are surgically repaired or replaced.

## CAUTION

### ***The RNS<sup>®</sup> System Magnet***

**DO NOT** drop the Magnet onto any hard surface. The Magnet can shatter into small, sharp pieces that can cut the skin.

## CAUTION

### ***Going through airport security and other surveillance systems***

Airport scanners, theft detectors and other security systems use technology that can temporarily disrupt stimulation while you pass through. Make sure to carry your Medical Implant ID card with you. The ID card explains that you are using the RNS<sup>®</sup> System. It may allow you to bypass a full body scan and receive a pat-down inspection instead. If you go through any scanner, stay to the center and move through the unit as quickly as possible. Leave the security area as soon as is practical. If you go through security systems without having followed these steps, it may temporarily disrupt stimulation while you are being scanned. For more information, contact your local airport security office or TSA (Transportation Safety Administration).

## CAUTION

### ***Household magnets/magnetic bracelets***

**DO NOT** put items that contain magnets within 4 inches of the Neurostimulator implant site. Make sure to keep any items containing magnets at least 4 inches away from the implant site. If you place items containing magnets within 4 inches of the implant site, you may disrupt stimulation. Stereo speakers, power tools and other devices may contain strong magnets that may interfere with stimulation. The same is true for magnetized items you may wear for therapeutic or other reasons. Since it is not always obvious if an item contains a magnet, refer to the packaging and instructions that came with the item for more information. You can also call the manufacturer of the item and ask them. Most commercially-available headphones/earphones do not disrupt stimulation when they come within 4 inches of the implant site. But not all types have been tested.

# What to Expect with the RNS<sup>®</sup> System

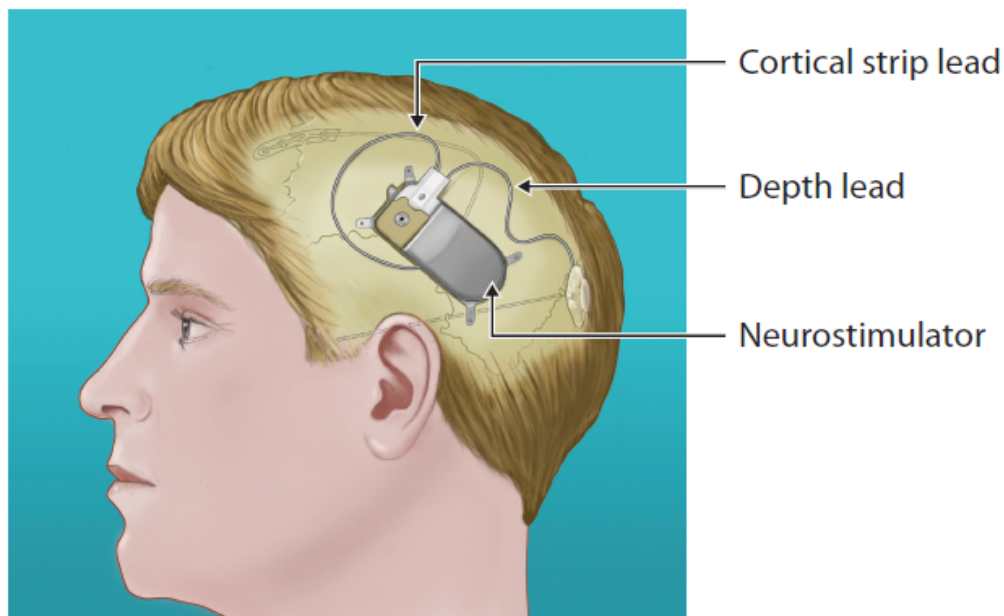
## Implant Surgery

### *Before your surgery*

Your doctor will carefully examine you to locate the areas in your brain where your seizures start. This helps determine where the Leads should be placed in the brain. Your doctor will also decide how many Leads to implant, depending on the location of your seizures. The **Cortical Strip Lead** is placed on the surface of the brain. The **Depth Lead** is placed inside the brain. Make sure your doctor explains all the risks associated with implant surgery, especially as they might relate to any other medical conditions you may have.

### *Your implant surgery*

Your surgeon will determine the best way to implant the Neurostimulator and connect the Leads. For most patients, the surgeon will cut a small hole into the skull to implant the Leads. The Leads will be secured at their insertion points. A second larger hole will be cut into the skull to implant the Neurostimulator. Then the Leads will be connected to the Neurostimulator. Incision areas will be sutured shut at the end of the surgery.



You may be under general anesthesia during the operation.

## ***Post-surgery recovery***

You may remain in the hospital for a few days following surgery until your doctor feels it is okay for you to return home. Your doctor will also use that time to make sure there have been no complications from surgery and may program your Neurostimulator for initial use. Your incision areas will be checked to make sure they are healing properly.

## **Ongoing treatment and monitoring**

The Neurostimulator delivers electrical stimulation to the brain when it detects abnormal brain activity that occurs before a seizure may be starting. You should not feel the stimulation. A few patients report that they feel the stimulation when first using the RNS<sup>®</sup> System. This side effect is usually resolved by your doctor making changes to the Neurostimulator settings.

The RNS<sup>®</sup> System is designed to reduce the frequency of seizures within the first few months following implant surgery. That reduction in seizure frequency should be maintained for as long as you continue to use the RNS<sup>®</sup> System as directed by your doctor. Talk to your doctor about what you can expect from using the System.

You may continue to experience seizures while using the RNS<sup>®</sup> System. Not everyone who uses the RNS<sup>®</sup> System will respond to stimulation the same way.

You will be expected to see your doctor for follow-up visits for as long as you use the RNS<sup>®</sup> System. The visits may be frequent at first and then not as often. At those visits, your doctor will adjust the Neurostimulator settings based on data you have collected from the Neurostimulator and sent to the PDMS database. You should talk to your doctor if you feel you are having seizures with greater frequency. It is a good idea to collect and send data to the PDMS database more frequently until your doctor is able to make adjustments.

Although the Neurostimulator and Leads are secured below your scalp, a blow to the head or neck may dislodge or damage them. If the parts move or are damaged, this may result in stimulation not being delivered until the Neurostimulator or Leads are surgically repaired or replaced. Talk to your doctor if you have had any type of head or neck trauma after you begin using the RNS<sup>®</sup> System.

The health risks associated with using the RNS<sup>®</sup> System are discussed in the *Benefits and Risks* section, and *Appendix A* of this Manual. Talk to your doctor about those risks that may require immediate attention, such as skin irritation near the implant site.

### ***The Remote Monitor***

You will use the Wand and Remote Monitor to collect data from the Neurostimulator, and then send the data to the PDMS database. You should collect data every day, and send the data to the PDMS database at least once a week. Your doctor may direct you to collect and send data more frequently.

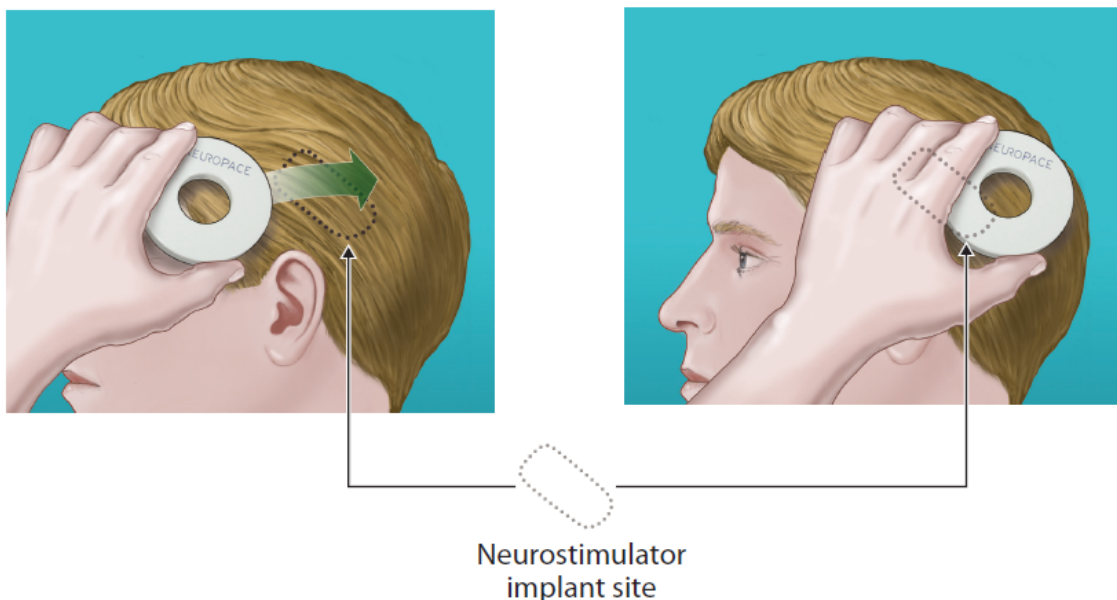
Complete instructions for setting up and using the Remote Monitor can be found in the Remote Monitor Manual.

### ***The Magnet***

The Magnet has two uses:

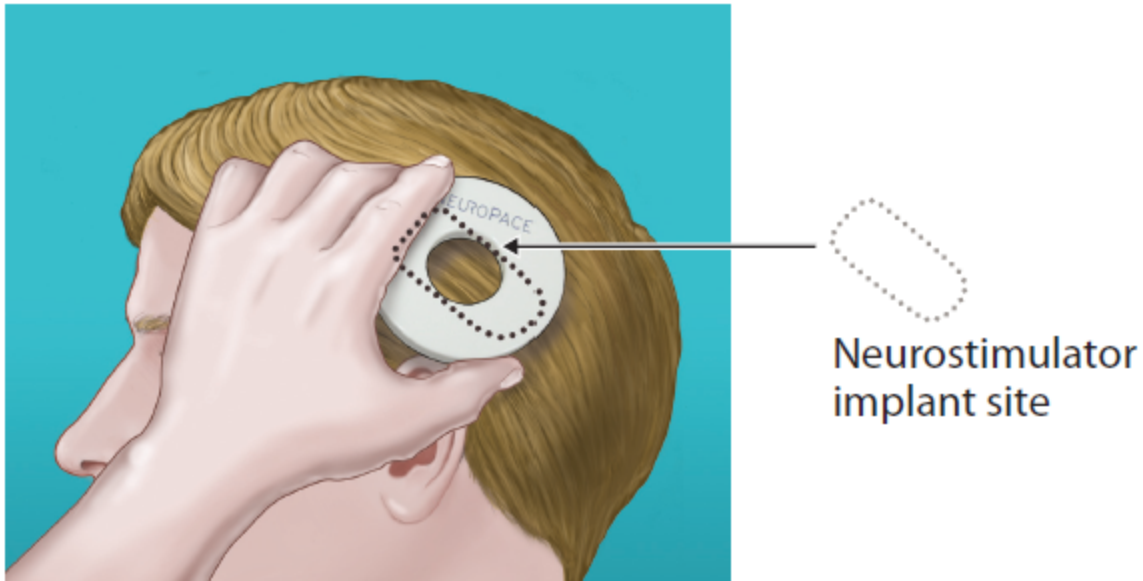
1) It instructs the Neurostimulator to make a recording of your brain activity when you choose. An example is when you feel a seizure starting. The recording will be included with the other data you collect with the Remote Monitor and send to the PDMS database. At your next office visit, your doctor can review your brain activity, and make adjustments to the Neurostimulator settings as needed.

To record an event, quickly swipe the Magnet over the Neurostimulator. **DO NOT** hold the Magnet in place over the Neurostimulator for more than 1 second.



2) It lets you temporarily stop stimulation. You may want to do this if you feel the stimulation.

To stop stimulation, hold the Magnet in place over the Neurostimulator. Stimulation will be stopped for as long as you hold the Magnet in place. When you move the Magnet away, stimulation will resume when abnormal brain activity is detected.



The only other way to stop stimulation is by your doctor adjusting the Neurostimulator settings.

## **When it's time to replace the Neurostimulator**

Your Neurostimulator is powered by a battery and will need to be replaced when battery power is low. The Neurostimulator should last 2 to 3.5 years with typical use. How long your battery lasts depends on the stimulation levels your doctor sets up in the Neurostimulator.

Your doctor will be able to determine when battery power is getting low by reviewing your data in the PDMS database. When the battery power gets very low, the Neurostimulator can be surgically removed and replaced with a new one. Replacement surgery will be less complex and should take less time than when the Neurostimulator was first implanted. Unless the Leads need to be replaced, the new Neurostimulator will be connected to the same Leads during the surgery. Your doctor may adjust the location of the Leads at that time.

## **Care and Maintenance**

### **Neurostimulator and Leads**

No special care and maintenance is required for the Neurostimulator and Leads. From the data you send to the PDMS database, your doctor will be able to see when the Neurostimulator battery power is getting low, or if the Neurostimulator is not working properly.

### **Remote Monitor**

Refer to the Remote Monitor Manual for information on care and maintenance of your laptop computer and Wand.

### **Traveling with the RNS<sup>®</sup> System**

There are a few things you need to be aware of when traveling.

#### **1) Going through airport security.**

Airport scanners use technology that can temporarily disrupt stimulation while you pass through. Make sure to carry your Medical Implant ID card with you. The ID card explains that you are using the RNS<sup>®</sup> System. It may allow you to bypass a full body scan and receive a pat-down inspection instead. If you go through any scanner, stay to the center and move through the unit as quickly as possible. Leave the security area as soon as is practical. If you go through security systems without having followed these steps, it may temporarily disrupt stimulation while you are being scanned. For more information contact your local airport security office or TSA (Transportation Safety Administration).

#### **2) Traveling for an extended period of time within the U.S.**

If you are unable to bring your Remote Monitor with you, you will not be able to collect data from the Neurostimulator and send it to the PDMS database as directed. Talk with your doctor in advance to find out what you should do in these situations.

Remember to take your RNS<sup>®</sup> System Magnet with you when you are traveling.

### **3) Traveling outside the U.S.**

Since the Remote Monitor uses a toll-free phone number only available when dialing within the (50) United States, it cannot be used to send data from a location outside the U.S. Talk with your doctor in advance to find out what you should do in these situations.

## **Appendix A: Clinical Studies: Risks and Benefits**

**NOTE:** There are risks and benefits associated with all medical devices and treatments. Talk to your doctor about the risks and benefits of the RNS® System and whether it is appropriate for you. Your doctor can also answer questions regarding the information in this Manual.

The risks and benefits of the RNS® System were measured in three clinical studies. Patients participating in the studies were all adults who had partial seizures that began from one or 2 focuses in the brain, and had frequent seizures that had not been controlled with at least 2 different antiepileptic medications. The first study was designed to show safety in 65 epilepsy patients who were being treated with the RNS® System for 2 years. The second study was designed to measure both the risks and benefits in 191 epilepsy patients being treated with the RNS® System and followed for 2 years. Following completion of one of the first two studies, patients had the option to enroll in the third long-term follow up study. During the third study, patients continued to receive stimulation and were followed for an additional 5 years to monitor long-term risks and benefits. The first two clinical studies have been completed and the third study is still ongoing.

All of the studies looked at the risks of the RNS® System by measuring the number of adverse events. Adverse events included any complication or complaint that arose during the studies. Adverse events were measured for all patients throughout all of the studies.

In order to understand the benefits of the RNS® System, the second study had a 3 month comparison period. During the comparison period, half of the patients received stimulation (Treatment Group) and the other half did not (Control Group). Following the comparison period, all patients were able to receive stimulation for the rest of the time in the study. The studies measured benefits by looking at whether patients being treated with stimulation had fewer seizures. Patients also filled out questionnaires about their quality of life.

### **Risks**

#### ***Adverse events***

All of the studies have shown that the RNS® System is safe and well tolerated. This includes any risks from surgically implanting the Neurostimulator and Leads, or from long-term use of the RNS® System. During the 3 month comparison period when the Treatment group was receiving stimulation and the Control Group was not receiving stimulation, there was no significant difference in the number of adverse events

between the Treatment Group and the Control Group. Also, the number of adverse events did not increase over the period of time during which patients have been followed. This suggests that the RNS<sup>®</sup> System is well tolerated over time.

### ***Serious adverse events***

Adverse events were classified as “serious” or “mild.” Adverse events were considered “serious” if they resulted in:

- Significant risk or impact on health
- Serious injury or death
- Hospital admission
- Surgery to stop or lessen the event

Serious adverse events associated with using the RNS<sup>®</sup> System did occur in each study, but at about the same rate (or less) as for comparable treatments such as epilepsy surgery or a neurostimulator for Parkinson’s disease.

Considering all of the studies, the following serious adverse events were reported in 2.5% or more of patients followed for an average of 2.8 years. Only those adverse events that were directly associated with using the RNS<sup>®</sup> System are included.

- Implant or incision site infections (not due to seizure) – 13 of 256 patients (5.1%)
- Increased frequency of tonic-clonic seizures – 10 of 256 patients (3.9%)
- Increased frequency of complex partial seizures – 8 of 256 patients (3.1%)
- Neurostimulator removal – 8 of 256 patients (3.1%)
- Intracranial hemorrhage (not due to seizure) – 7 of 256 patients (2.7%)

### ***Deaths***

Sudden unexpected death in epilepsy (SUDEP) is a term used when a person with epilepsy suddenly dies without a clear cause of death. The actual cause of SUDEP is unknown. As many as 1 in 100 people with severe epilepsy die of SUDEP every year.

All patient deaths were tracked as part of the studies. Six out of a total of 9 deaths were linked to SUDEP over a total of 708 “patient years” of treatment. This means there were about 0.85 deaths linked to SUDEP each year for every 100 patients. In addition to the 6 SUDEP related deaths, one patient died of lymphoma and 2 patients committed suicide.

### ***Neurostimulator and Lead failures***

The Neurostimulator and/or Leads were replaced in a few patients due to device malfunction or for other reasons. A few Neurostimulators were replaced because the battery drained prior to its expected life. This occurred in about 4 out of every 100 patients (4%) in the combined studies. The type of battery that drained prematurely is no longer being used in the Neurostimulator. After the battery type was changed, there have not been any Neurostimulator replacements for this reason. Lead replacements due to breakage occurred in about 3 out of every 100 patients (3%) in the studies.

### **Benefits**

The RNS<sup>®</sup> System has been shown to reduce the frequency of disabling seizures in adults with partial onset seizures that have not been controlled with antiepileptic medications. The reduction in seizures continues over time.

In the comparative study, seizure frequency was measured for 3 months in both the Treatment Group (received stimulation) and the Control Group (did not receive stimulation). The Treatment Group had an average of 11 fewer seizures per month than they did at the start of the study. This was significantly better than the Control Group that had an average of 5 fewer seizures per month.

In the second part of the study, the Control Group began receiving stimulation. After 4 months of stimulation, this group of patients had an average of 8 fewer seizures per month.

When results of both patient groups are combined, 3 out of 4 patients (75%) who received stimulation had some reduction in seizure frequency. After 1 year, almost half of the patients (46%) had at least a 50% reduction in their number of seizures. The reduction in seizures with the RNS<sup>®</sup> System has been maintained with long-term use.

The comparative study also included a patient survey on quality of life (QOL). QOL was measured before and after being treated with the RNS<sup>®</sup> System. Four out of 10 patients (40%) in the study showed a significant improvement in overall QOL after both 1 year and 2 years of treatment. Four out of 10 patients (40%) also showed significant improvements in memory, and significantly less worry about seizures and less discouragement about their health.

## **If You Need Help**

### **Contact your doctor as soon as possible if:**

- You are experiencing seizures with greater frequency or severity than before
- You are having any type of medical emergency
- You want to check if you can undergo a certain medical procedure or treatment while you have the RNS<sup>®</sup> System implanted.
- You are unable to collect and send data to the PDMS database as your doctor has directed

### **Contact NeuroPace<sup>®</sup> Customer Support if:**

- You need help setting up or using the Wand and Remote Monitor
- You want to make sure your current phone lines and equipment will work with the Remote Monitor
- You need to replace any part of the Wand or Remote Monitor
- You need more information about what to do when traveling through airport security and other surveillance systems

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**Website: [www.neuropace.com](http://www.neuropace.com)**